AF/1762 ZPW

Docket No.: L&L-I0078

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MAIL STOP: APPEAL BRIEF-PATENTS

By: Kong Kong Chen Date: November 2, 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Before the Board of Patent Appeals and Interferences

Applic. No.	:	09/939,330 Confirmation No.: 3872
Inventor	:	Alfred Kersch et al.
Filed	:	August 24, 2001
Title	:	Method of Producing a Ferroelectric Solid-State Layer Using an Auxiliary Substance
TC/A.U.	:	1762
Examiner	:	Eric B Fuller
Customer No.	:	**24131**

Hon. Commissioner for Patents
Alexandria, VA 22313-1450

APPEAL BRIEF

S i r :

This is an appeal from the final rejection in the Office action dated May 23, 2005, finally rejecting claims 1-9.

Appellants submit this *Appeal Brief*, including payment in the amount of $500.00 to cover the fee for filing the *Appeal Brief*.

Petition for extension is herewith made. The extension fee for response within a period of one month pursuant to Section 1.136(a) in the amount of $120.00 in accordance with Section 1.17 is enclosed herewith.

11/04/2005 NNGUYEN1 00000059 09939330

01 FC:1402 500.00 OP
02 FC:1251 120.00 OP

Real Party in Interest:

This application is assigned to Infineon Technologies AG of München, Germany. The assignment will be submitted for recordation upon the termination of this appeal.

Related Appeals and Interferences:

No related appeals or interference proceedings are currently pending, which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

Status of Claims:

Claims 1-9 are rejected and are under appeal. Claims 10 and 11 were cancelled in an amendment dated August 27, 2003.

Status of Amendments:

No claims were amended after the final Office action. *A Response under 37 CFR § 1.116* was filed on July 25, 2005. The Primary Examiner stated in an *Advisory Action* dated August 24, 2005, that the request for reconsideration had been considered but did not place the application in condition for allowance.

Summary of the Claimed Subject Matter:

The invention of the instant application relates to a method of producing a crystalline solid-state layer by chemical vapor deposition. See page 1, lines 8-10 of the specification. The

method includes the following steps: providing a reactor chamber (10, 20) with an interior space and a reactor wall (1, 21) having a first side formed with inlet openings (30) communicating with the interior space and a second side; mounting a substrate (3, 23) having a surface at the second side of the reaction wall in the interior space of the reactor chamber; providing a distributor plate (2, 22) in the interior space of the reactor chamber; performing chemical vapor deposition by introducing into the interior space starting gases (P) containing elements of a solid-state layer to be deposited on the surface of the substrate and at least one auxiliary substance (H) through the inlet openings; providing the auxiliary substance in a form containing molecules having a dipole moment and a property of briefly attaching themselves, during a deposition process, to the surface of the substrate with a dipole moment perpendicular to the surface of the substrate in order to dictate a crystal structure of the solid-state layer; providing the reactor chamber with a first gas outlet (5, 25); pumping away a first part of reaction products through the first gas outlet; providing the reactor chamber with a second gas outlet opening (26) formed in the reactor wall downstream of the substrate; providing a connecting line (27) connecting the second gas outlet opening (26) to one of the inlet openings located upstream of the distributor plate for feeding a second part of the reaction

products back to the one of the inlet openings; and configuring, in the connecting line, a valve (28) for controlling gas flow, the valve having an inlet and an outlet, the second gas outlet opening (26) being directly connected to the inlet of the valve and the outlet of the valve being directly connected to the one of the inlet openings located upstream of the distributor plate. See Figs 1 and 2 and pages 14-16 of the specification.

References Cited:

6,159,855	Vaartstra	December 12, 2000
4,468,283	Ahmed	August 28, 1984

Grounds of Rejection to be Reviewed on Appeal

1. Whether or not claims 1-9 are obvious over Vaartstra in view of Ahmed under 35 U.S.C. §103(a).

Argument:

Whether or not claims 1-9 are obvious over Vaartstra in view of Ahmed under 35 U.S.C. §103(a).

In the section entitled "Claim Rejections - 35 USC § 103" on pages 2-3 of the above-mentioned Office action, claims 1-9 have been rejected as being unpatentable over Vaartstra in view of Ahmed under 35 U.S.C. § 103(a).

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 1 calls for, inter alia:

> configuring, in the connecting line, a valve for controlling gas flow, the valve having an inlet and an outlet, the second gas outlet opening being directly connected to the inlet of the valve and the outlet of the valve being directly connected to the one of the inlet openings located upstream of the distributor plate.

In the section "Response to Arguments" on page 2 of the Office action, the Examiner has referred to column 6, lines 1-5 of Ahmed, which reads "... the exhaust stream from the integrated growth process can be discharged either at an appropriate point within the recycle line as shown in Fig. 1 at 23, or through an independent outlet within the growth chamber." Apparently, the Examiner has combined the above-mentioned embodiment of Ahmed with the technical teaching of Vaartstra and believed that a combination thereof reaches the invention of the instant application.

Appellants disagree. Claim 1 of the instant application recites that a valve (28), as shown in Fig. 2 of the instant application, is arranged in the connecting line (27). It is noted that the discharge line 20 as shown in Fig. 1 of Ahmed does not contain a valve.

The Examiner apparently believes that, when combining Ahmed with Vaartstra, a person skilled in the art would take the valve 39 as shown in the only figure of Vaartstra and insert this valve 39 into the discharge line 20 of Fig. 1 of Ahmed. However, Appellants believe that a person skilled in the art would not do so because this would run counter to the teaching and aim of Ahmed. In Ahmed, it is taught that it is advantageous to achieve a high flow velocity of the reaction gases flowing through the discharge tube 20 back to the growth chamber 5 along the surfaces of substrates 7-15. It is shown in Fig. 3 of Ahmed that a higher growth rate can be reached when the velocity is increased from a value V_1 to a value V_2. Therefore, it is important that the reaction gases supplied by the nozzle 18 are injected with a high velocity into the diffusion tube 19 in order that it transports the reaction gases with a correspondingly high velocity into the discharge line 20. Such reaction gases may then be transported through the discharge line 20 to the reaction chamber 5 with a correspondingly high velocity.

When a high streaming velocity of the reaction gases is so important, why should a person skilled in the art insert a valve into the discharge line 20? Such a valve would throttle the reaction gases and cut-down their streaming velocity in a

significant manner. By cutting down the streaming velocity of the reaction gases, the growth conditions would be substantially deteriorated according to the teaching of Ahmed.

Appellants, therefore, believe that a person skilled in that art would not place a valve into the discharge line 20 of Ahmed.

The Examiner has argued in the Advisory action dated August 24, 2005 that a person skilled in the art would start from Vaartstra and then add the features of Ahmed to arrive at claim 1 of the instant application. However, as discussed above, Ahmed teaches that it is important to obtain a high flow velocity of the reaction products as recycled to the reaction chamber and flowing along the wafers. Therefore, if a person skilled in the art would add the technical teaching of Ahmed to Vaartstra, he or she would omit the valve 39 as shown in the single figure of Vaartstra in order to ensure the highest possible velocity of the reaction product to the reaction chamber.

The Examiner has argued that according to Bernoulli's equation a valve would actually increase the velocity of the stream. This is only correct if, for example, a Venturi valve is regarded. The stream velocity is indeed higher in the region

of the low cross-sectional area as compared to the region with the high cross-sectional area. However, the Examiner's argument is not correct when comparing the one situation having a valve in the connecting line with the other situation having no valve in the connecting line. It is totally clear from the single figure of Vaartstra that the flow rate and also the streaming velocity of the reactant gas source 19 through the connecting line 38 to the reaction chamber 22 would be maximized if the valve 39 would be omitted. The insertion of the valve 39 into the connecting line 38 reduces the flow and the streaming velocity rate from this maximum value in order to better control the flow rate of the reactant gas source 19 to the reaction chamber 22. This is the reason why a person skilled in the art would omit the valve 39 when adding Ahmed to Vaartstra since he or she had learned from Ahmed that it is important to have a streaming velocity as maximum as possible.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claim 1, they are believed to be patentable as well.

In view of the foregoing, the honorable Board is therefore respectfully urged to reverse the final rejection of the Primary Examiner.

Respectfully submitted,

Yonghong Chen

Yonghong Chen (56,150)

YC/bb

Date: November 2, 2005
Lerner and Greenberg, P.A.
Post Office Box 2480
Hollywood, Florida 33022-2480
Tel: (954) 925-1100
Fax: (954) 925-1101

Claims Appendix:

1. A method of producing a crystalline solid-state layer by chemical vapor deposition, which comprises:

providing a reactor chamber with an interior space and a reactor wall having a first side formed with inlet openings communicating with the interior space and a second side;

mounting a substrate having a surface at the second side of the reaction wall in the interior space of the reactor chamber;

providing a distributor plate in the interior space of the reactor chamber;

performing chemical vapor deposition by introducing into the interior space starting gases containing elements of a solid-state layer to be deposited on the surface of the substrate and at least one auxiliary substance through the inlet openings;

providing the auxiliary substance in a form containing molecules having a dipole moment and a property of briefly attaching themselves, during a deposition process, to the surface of the substrate with a dipole moment perpendicular

to the surface of the substrate in order to dictate a crystal structure of the solid-state layer;

providing the reactor chamber with a first gas outlet;

pumping away a first part of reaction products through the first gas outlet;

providing the reactor chamber with a second gas outlet opening formed in the reactor wall downstream of the substrate;

providing a connecting line connecting the second gas outlet opening to one of the inlet openings located upstream of the distributor plate for feeding a second part of the reaction products back to the one of the inlet openings; and

configuring, in the connecting line, a valve for controlling gas flow, the valve having an inlet and an outlet, the second gas outlet opening being directly connected to the inlet of the valve and the outlet of the valve being directly connected to the one of the inlet openings located upstream of the distributor plate.

2. The method according to claim 1, wherein the step of introducing the auxiliary substance includes feeding the auxiliary substance into the interior space from an external supply source.

3. The method according to claim 2, which comprises providing the external supply source as a storage container.

4. The method according to claim 1, which comprises:

providing the auxiliary substance substantially from reaction products being pumped away from the interior space during the chemical vapor deposition.

5. The method according to claim 1, which comprises providing the solid-state layer as a layer selected from the group consisting of a ferroelectric layer and a paraelectric layer.

6. The method according to claim 5, which comprises providing the solid-state layer with a Perovskite structure.

7. The method according to claim 1, which comprises:

setting the distance between the distributor plate and the substrate preferably at approximately 1 cm.

8. The method according to claim 1, which comprises providing the distributor plate as a perforated plate.

9. The method according to claim 1, which comprises introducing a carrier gas through the inlet openings.

Evidence Appendix:

No evidence pursuant to && 1.130, 1.131, or 1.132 or any other evidence has been entered by the Examiner and relied upon by appellant in the appeal.

Related Proceedings Appendix:

Since there are no prior or pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal, no copies of decision rendered by a court or the Board are available.